U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

EUGENE DISTRICT OFFICE

FISH CREEK AQUATIC HABITAT RESTORATION PLAN

AND ENVIRONMENTAL ASSESSMENT OR-090-00-22

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U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE
FISH CREEK AQUATIC AND RIPARIAN HABITAT RESTORATION PROJECT

PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT

EA NO. OR-090-00-22

The Coast Range Resource Area, Eugene District, Bureau of Land Management, has completed an Aquatic and Riparian Habitat Restoration Plan and Environmental Assessment for aquatic habitat managed by the District in the Fish Creek subwatershed, Lake Creek watershed, Siuslaw River basin, western Lane County, Oregon.

The design features of the Proposed Action and Alternatives are described in the Environmental Assessment OR-090-00-22. Project work would improve the quality of aquatic and riparian habitat in the Fish Creek subwatershed. The Proposed Action is an update of project plans prepared in 1983 and an HMP prepared in 1987 and partially implemented. The Proposed Action is fully consistent with the objectives and management recommendations in the Eugene District RMP and ROD and Lake Creek Watershed Analysis prepared under the RMP, and the Aquatic Conservation Strategy in the Northwest Forest Plan.

Based on extensive experience in the Fish Creek subwatershed, on aquatic habitat management activities elsewhere in the Lake Creek Basin and the Siuslaw River Basin, and on the evaluation of similar projects and management activities in other locations, no significant adverse impacts are expected to: Flood plains or wetland/riparian areas, wilderness values, cultural resources, prime or unique farmland, wild and scenic rivers, air quality, Native American religious concerns, invasive non-native species, environmental justice or water quality. Following consultation with the U.S. Fish and Wildlife Service it was determined this action would not jeopardize the continued existence of any federally listed terrestrial species known to occur in the vicinity. All proposed actions are consistent with the description and terms and conditions for aquatic and riparian restoration projects in the National Marine Fisheries Service Biological Opinion of 4 June 1999 for the Coastal Coho Salmon.

Determination

On the basis of information contained in the EA, and all other information available, it has been determined that the Alternatives analyzed will not have significant environmental impacts not already addressed in the Eugene District Resource Management Plan and Record of Decision, and do not constitute a major Federal action affecting the quality of the human environment. Therefore, an Environmental Impact Statement is not necessary and will not be prepared for this proposal.

DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT
FISH CREEK AQUATIC AND RIPARIAN HABITAT RESTORATION PROJECT

ENVIRONMENTAL ASSESSMENT NO. 0R0-EA-00-22

PURPOSE AND NEED

Fish Creek in the Lake Creek basin is one of the most productive streams for salmon and steelhead on the Pacific Coast. Numbers of spawning fish have exceeded the productive capacity of the stream. In order to increase productivity, an Aquatic Habitat Restoration Plan was initiated in 1984. The Plan was later incorporated into the Lake Creek Aquatic Habitat Management Plan. Only a portion of the proposed Restoration Plan has been implemented. During flooding in February, 1996, over 20 natural log structures in Fish Creek were dislodged by debris from an upstream channel failure in a tributary to Fish Creek that flowed down Fish Creek and carried the large logs out of Fish Creek. Most of the lost logs were located in the lower reaches of Fish Creek, in an area heavily used by spawning chinook and coho salmon. As a result of the loss of the structures created by these logs, extensive reaches of gravel have eroded away, considerably reducing the potential spawning areas. The proposed action is to continue the implementation of the Aquatic Habitat Restoration Plan and to transport wood from trees deposited in the riparian area by a channel failure at or above one of the project areas for placement in the stream channel to replace the lost natural structure. The Proposed Action would improve habit in the project area and restore spawning gravels in lower Fish Creek.

OBJECTIVES

To continue implementation of the Fish Creek Aquatic Restoration Plan and Lake Creek Aquatic Habitat Management Plan by placing log and boulder structures in Fish Creek.

To increase the portion of the Fish Creek riparian area in conifers as a future source of riparian and stream structure through conversion of existing vegetation to conifer and maintenance of previously planted riparian conversion projects.

To replace natural wood structures lost from Fish Creek with replacement log structures in order to restore and stabilize salmonid spawning and rearing areas.

BACKGROUND

Fish Creek

Fish Creek arises on the western slopes of the Coast Range, flowing southwesterly and westerly to join Lake Creek below Lake Creek Falls in Township16S, Range7-W, Section 30. It is a moderate

gradient stream with variable valley floor confinement. Except for the lowest half mile, the mainstem of Fish Creek is managed by BLM. The rest of the basin, including tributaries, is a mixture of public and private ownership. The basin is essentially all managed for timber, most of it in second growth. Active harvest continues in the watershed.

Headwaters are steep, arising on the divide between the Siuslaw River and Willamette River basins. Tributaries are typically steep in the upper reaches, go through a short transitional zone, then flatten where they cross the Fish Creek floodplain. One large tributary enters from the north in Section 29. A road parallels most of the length of Fish Creek, with additional roads throughout the basin. The watershed has had a number of major landslide/channel failure events, the most recent in 1996.

Pool:riffle ratio is about 1:1, with some cascades and rapids. Substrates are a mixture of sizes, with over 10% exposed bedrock. The percentage of bedrock substrate has decreased as a result of past restoration activities. Pools are generally of a larger size, but only moderately deep. The types of pools present are more diverse than most other Lake Creek Watershed streams, including good off-channel and rearing habitat. This is partly due to natural conditions, partly due to extensive beaver activity, and partly due to habitat improvements placed in the stream. Habitat generated by beavers has declined in recent years due to extensive trapping that has removed essentially all beaver from the watershed.

The channel is generally stable, with excellent shading. Some exposed banks are present, mostly in the lowest reaches on private lands where Fish Creek has downcut to compensate for elevation changes in Lake Creek. Some channel cutting occurred during the 1996 flood/landslide event, mostly a result of the dislodgement of natural wood that had stabilized the channel.
Riparian vegetation is mostly young, dominated by red alder and big leaf maple. Some conifers are present, but few of any size. Natural instream woody material is sparse, mostly of a small size. During the 1996 flood, about 20 large naturally-occurring logs, the majority in the lower reaches, were lost from the watershed, decreasing channel stability.

Beginning in 1985, BLM carried out several riparian vegetation restoration projects, primarily underplanting of cedar and other conifer species, with some thinning of red alder. Early cedar plantings, without tubing, ended up with little success due to herbivore predation and inadequate opening of the canopy. Later plantings had somewhat better survival, although in a count made in winter, 1994, following a period of cold temperatures and snow, less than 40% of the planted and tubed cedars were still alive from the planting done the winter before. Larger areas were planted following 1995 stream restoration work. These trees show good survival but growth has been hampered by competing vegetation and rapid recovery of adjoining alder canopy.

Two other small riparian projects looked at size of planted trees and brushing impacts on planted trees. One project was designed to look at survival of cedar trees larger >4 foot tall planted inside and outside an exclosure. Initially, growth and survival were similar inside and outside the exclosure. However, after nine months, hedging became moderate to severe on the plants outside the exclosure compared to those inside, although growth otherwise was similar. Long term survival and growth inside the exclosure were higher than outside.

In the second project, designed to look at the effect of controlling competing vegetation, three units were planted with bare root cedars. One plot completely cleared of competing vegetation and the canopy partially removed, one was partially cleared of competing vegetation, and the third plot was left uncleared. Fencing for the partial clearing was stolen within two weeks and the trees rapidly eaten. After two years, the survival and growth in the other two plots were similar. Subsequent survival was similar in the two exclosures. In the exclosure which was brushed, part of the plot was lost to flooding by a large downstream beaver dam. Growth was considerably better in the brushed exclosure; in the unbrushed, the trees on the margin, where there is more sunlight, had greater growth than those further in. The results suggest that, for cedar, brushing does improve the growth rate.

In another mixed planting of cedar and hemlock in the lower Fish Creek floodplain, survival was similar, but poor, with both species. These trees were planted near the stream in an open area created by former beaver activity and were subjected to periodic flooding during the winter.

Additional riparian plantings followed restoration activities in 1995. Trees were tubed with flexible or stiff tubes, and some trees had mats placed around the base. The flexible tubes often led to the tops of the trees being pulled down and poor tree growth. Brush control was variable; where aggressive, the trees did much better.

From the variety of plantings in the Fish Creek watershed, several points became clear. The most successful growth occurs where the canopy is opened to provide sufficient light, where brush is actively controlled, and where animal feeding on young trees is controlled. Similar results were obtained at other District planting sites and some Forest Service planting sites in the Siuslaw Basin. In general, three year old trees did better than two year old.

Fish Creek has runs of coho and chinook salmon and steelhead and searun cutthroat trout. For many years, beginning about 1960, the State planted coho and steelhead above Lake Creek Falls for rearing although returning adults were unable to pass over the falls and would seek alternative places to spawn. Because of its proximity to the base of Lake Creek Falls, Fish Creek received an unusual abundance of spawners as many of the returning planted fish, unable to pass over the falls, moved into Fish Creek to spawn. The chinook run in Fish Creek varied with stream flows; when low, fish spawned in Lake Creek, when flows were high, they move up in Fish Creek as much as three miles, although spawning is generally concentrated in the lower mile. Steelhead also show a variable pattern of response to flows, although not to the same degree as chinook, moving further upstream in years of higher flow. Steelhead, and coho, will pass upstream to the forks at the Section 22/27 line where a culvert presents a barrier to further upstream movement.

Fish numbers in Fish Creek exceeded numbers of fish per mile of most other fish-bearing streams in the Siuslaw basin. Overall trends in fish numbers followed the coast-wide pattern, with low numbers in the 1983-84 period, some increase in the later years of the 80's, and a decline in the latter half of the 1990s. Some of these fish were the product of adult spawning in Fish Creek, others were probably from planting of juvenile fish above Lake Creek Falls to help develop the upper basin runs.

Habitat was shown to be spotty in the 1983 inventory. The best habitat was associated with beaver dams in the upper reaches of Fish Creek. Extensive reaches of bedrock, found in areas without beaver or woody structure, reduced the potential for habitat. Stream structure was sparse; where present, larger wood and beaver dams provided most of the good habitat. Some natural boulder habitat is present, but, like most streams in the Siuslaw Basin, the natural delivery of boulders to the stream system is slow.

Because of the more abundant returning number of adult anadromous fish to Fish Creek, available spawning and rearing habitat was over-utilized. The potential for habitat restoration to improve fish production, and the preponderance of public ownership in the basin, made Fish Creek a good candidate for restoration activities. BLM in 1983 began an extensive habitat restoration effort in Fish Creek. Initially, in 1984, 23 gabions were placed in Fish Creek. In 1985-1987, additional gabions, alder and conifer structures, and boulder weirs were placed in the channel. Placement was predominantly in locations dominated by bedrock. Beavers built dams on many of the projects, creating some quite large pools. Monitoring showed a shift in fish use from elsewhere in the watershed onto the projects, a pattern of use that has continued. Some of the projects, particularly those of alder, broke apart after one or more years. Some of the gabions also began to break apart in the early 1990s, not unexpected since gabions have an average life span of 10 years. The projects continued to retain gravels and other sediments, and create a variety of spawning and rearing habitat.

In 1995, BLM pulled 35 of the original 37 gabions, all but two having begun to fall apart. The gabions were replaced with a variety of log and boulder structures located at the same sites as the gabions. During the 1996 flood, the only damage to the new structures was the shattering of a log and the dislodgement of a boulder weir at the uppermost project location. Otherwise, all projects placed in 1995 structures held firm, and accumulated large amounts of sediment and debris.

Natural wood structure, created by trees falling into Fish Creek, was lost during the flooding. The project structures were anchored with cable and were able to withstand the pressures of large amounts of sediment, debris and water flowing down Fish Creek. The natural structures were dislodged by the flooding, and were carried out of the system.

Beaver, long an important source of habitat in Fish Creek, were trapped out several years running in the late 1990s. Older beaver structures have fallen apart, and no dams built in recent years. The result is a loss of some of the most important rearing habitat in the watershed.

Numbers of fish have fluctuated, but Fish Creek continues to have one of the highest counts, both in total numbers and fish per mile, of any stream along the Oregon coast, particularly for coho salmon. Spawning habitat is abundant, but collections made by ODFW in 1994 (Beidler, pers. comm.) suggest that available rearing habitat is inadequate for the large number of fry produced. Poaching of fish, particularly chinook, continues to be a problem, both because of the accessibility, and the reputation for numbers of fish.

Proposed restoration activities include replacing the large natural logs lost during the 1996 flooding. Since their loss, the amount and quality of spawning habitat available, particularly for chinook, has declined. Additional project locations which would benefit from stream structure were identified in the 1984 Project Plan but were never built; these sites are still suitable for restoration activities. Two culvert replacement projects have been identified; one on the tributary paralleling the 16-7-27.1 road, the other at the 16-7-30 road crossing in Section 22. Riparian restoration opportunities are present at other sites along Fish Creek; priority should also be given to maintaining the existing riparian restoration sites. This EA is for project work specific to replacement of natural log structure lost during the 1996 flooding and proposed project activity described in the 1984 Project Plan, found to be still suitable for restoration activities which have yet to be implemented.

PROPOSED ACTIONS

Proposed projects are located in Fish Creek, a tributary of Lake Creek, Siuslaw River Basin in north-central Lane County, Oregon. Proposed actions are on public lands in Township 16 south, Range 7 west, Sections 27, 29 and 33. Maps and descriptions in the Appendix show details of specific project sites.

The primary component of the Proposed Action is the placement of structural materials in Fish Creek in order to restore spawning and rearing habitat for anadromous and resident fish, riparian restoration activities proposed in conjunction with the placement of structure, and maintenance of existing riparian restoration plots.

1. Channel Structure

Channel structuring involves placement of materials in the channel to raise the channel elevations, increase deposition of spawning gravels, and to increase the complexity of habitat in the channel. Materials to be used in the Proposed Action used are primarily logs and boulders delivered to the project area or which are present in the general project area. Designs are based on existing structural features occurring naturally in the system, and on structure designs previously developed by the Eugene District, other BLM Districts, or other agencies. Locations are based on inventories completed by BLM that identified suitable sites, with accesses, and on the locations of logs in the channel that were washed out in the 1996 flooding. Proposed structures are designed specific to a location, and take into account existing channel and riparian features.

Materials may be delivered to designated sites at the project location well in advance of project work and stockpiled at the project site; or they may be delivered to the site at the time they will be used, reducing the need for stock-piling and handling. Sites for stockpiling of materials are generally close to the paved Road 16-7-30, and are designated by flagging by BLM personnel.
For the Proposed Action, most of the logs to be used that are already near the project area will come from materials washed out of a second order tributary in 16-7-23. This material is on a delta in the floodplain 100 meters or more from Fish Creek. These woody materials include logging debris already in lengths suitable for placement in the creek.

Creation of structural features utilizes heavy equipment to deliver and place the materials. Once in place, the larger structural materials are generally anchored to the substrate using cables and epoxy. Smaller logs, rock and gravel may be allowed to move in response to the current. Because of the lack of retention features, many of the materials, particularly logs, would move out of the river system if not anchored. Once anchored, they create collection points to retain placed material or materials entering the channel from adjoining slopes.

Structural materials for most project work will be delivered to the channel and placed in position in the channel using an excavator. Temporary accesses are created from existing roads through the riparian area to the channel. Most access routes will be under 200 feet in length, and are generally located in areas where riparian vegetation restoration is planned. Access routes involve removal of brush and some alders; conifers and big leaf maples are generally retained. Following completion of project work, the accesses are sub-soiled to create planting sites. The development and rehabilitation of the access routes are designed to reduce the potential for erosion and channel disturbance. In previous project activity in Fish Creek, over 90% of the accesses followed older travel routes already present in the riparian zone.

Several types of channel structures are proposed. The structures are placed in combinations in and along the channel. Design depends upon the existing conditions and potential of the site. The following descriptions are for the general types of structures used.

- Ramp logs are logs with one end up on the bank and the other end extending into the channel.
- Log jams: Logs are interlocked to recreate a natural debris jam. Some of the jam logs extend up onto both banks providing structural stability.
- Boulder weir with logs: One half to one-yard boulders over two feet in diameter are placed across the stream channel and extending onto adjacent banks to prevent end cutting. Logs are placed with boulders to provide cover and complexity and to provide collection points for woody debris.
- Log and boulder placement: Individual or clusters of logs and/or boulders are placed in and along the margin of the channel.

Fiscal Year 2000 stream structure project installations are planned for August.

2. Riparian Restoration

The purpose of riparian restoration is to increase the percentage of conifers in the riparian area as a future source of large woody material in the channel, and to create snags and woody debris in the riparian area. Red alder, with some big leaf maple and mixed-age conifers currently dominates riparian zones. Restoration efforts are planned primarily for the red alder-dominated and brush communities. In developing accesses from existing roads into the stream channels, routes are selected that facilitate riparian restoration. Red alder along the access routes are removed, with the downed trees placed in nearby riparian areas or in the stream channel. Once the stream channel project work is completed, the access routes are subsoiled to create suitable conditions for planting of trees. Additional red alder may be removed in patches adjoining or away from the access routes to reduce shading in planting sites. Brush may be removed from additional adjoining sites. The sites where trees and brush are removed

away from the access routes are not usually subsoiled. Trees are felled using chain saws or other hand equipment, are girdled and allowed to die and fall over time, or are felled using heavy equipment (i.e., excavator). Brush is generally removed in areas where trees are felled or girdled. Conifers and larger big leaf maple are preserved wherever possible. Where younger conifer are present, competing vegetation may be removed to release the conifer.

During the subsequent planting season, usually the winter months following site preparation, trees are planted in the prepared locations. Species for planting include Douglas-fir, western redcedar and western hemlock, depending on the site conditions and proposed species mix. Trees are tubed to reduce browsing. Competing vegetation is controlled by placing mats around the trees, or by brushing during subsequent years. For FY 2000 riparian plots have been identified for conversion in conjunction with stream restoration activities. These plots (~ one acre each) have been planned adjacent to sites located near stream enhancement to be prepared during the same period as the stream habitat restoration. Accesses used for stream efforts may also be used for riparian conversions. All riparian conversions during FY2000 will be conducted on the North side of the stream channel to minimize shading issues. Much of the brush and alder removal will be accomplished with the excavator used for stream enhancement. Some of the tree falling may be accomplished using fellers.

Several riparian restoration areas planted during the past five years have developed extensive growth of competing vegetation. It is proposed to brush the areas around the planted trees. In order to work more safely, alders girdled at the time the sites were prepared for planting may be felled. These dead trees are considered a safety hazard to people doing the brushing.

ALTERNATIVES TO THE PROPOSED ACTION

1. No Action Alternative

Under a No Action Alternative, no project work would be completed. The stream channel would be allowed to evolve without addition of structural material. The riparian community would continue to undergo successional changes along current pathways.

2. Partial Implementation Alternative

Under the Partial Implementation Alternative not all proposed actions would be implemented at this time. The only change from the Proposed Action is the scope of restoration activity, not the type of activity, that would be implemented.

ANALYSIS OF IMPACTS

PROPOSED ACTION

Activities included in this Fish Creek Aquatic Habitat Restoration Plan and EA are consistent with those proposed in previous versions of the Restoration Plan and Lake Creek Aquatic Habitat Management

Plan Environmental Assessments. The types of impacts observed following previous project activities are consistent with the anticipated impacts described in those documents.

All proposed actions would require some disturbance of the road right of way, riparian zone or stream channel. All actions are in locations that have been previously disturbed by management activities. The extensive existing road network provides access for most locations for which activities are proposed. No new semi-permanent or permanent roads would be created as a result of the proposed actions, although temporary accesses would be needed for movement of equipment and materials from existing permanent roads to restoration sites in the riparian and stream channel. During past restoration activities in the Fish Creek Watershed, up to 90% of the accesses used for implementing riparian and in-channel projects utilized older existing access routes. Where available, existing access routes and roads would be utilized for access into and through the riparian area. All temporary accesses and most of the existing access routes that would be utilized for project work would be rehabilitated and revegetated after project work is completed.

The primary immediate impacts of the proposed actions are the potential reduction in riparian vegetation, transitory increase in sediment production, disruption of riparian soils, and disturbance of terrestrial and aquatic communities. Timing of the work during low water periods, maintenance of buffers around work in riparian areas and on-site steps to control erosion are used to limit potential impacts. The longer-term impacts of the proposed actions are to increase the available aquatic habitat and increase the supply of large conifers in riparian zones.

Clearances for sensitive, proposed, listed or survey and manage plant and animal species have been completed in association with proposed on-ground work and any necessary adjustments made to the plan to protect species located during clearances. If any sensitive, proposed, listed or survey and management plant or animal species is found in the project area during project work activity, the proposed project would be modified or canceled. Accesses, project activities and timing of project work will take into account potential impacts on wildlife, such as migration and nesting periods. The primary impact to wildlife is expected to be disturbance from operation of heavy equipment in riparian areas and the stream channel. The disturbances would be short-term.

As a result of the placement of structures in the stream, water surface levels would be raised at all flow levels, with the degree of flow increase depending on the type and size of structure. During peak flows more water would flow into riparian areas. While erosion is expected to increase in the short term as a result of project activities in the riparian and in-channel, project designs reduce the potential erosion. The flooding of riparian areas provides a positive benefit for deposition of silts in riparian areas and increased groundwater infiltration, and for increased feeding opportunities for aquatic species. Previous stream projects that have raised water levels have resulted in an increase in wetlands in the adjoining riparian area. The projects are expected to contribute to an overall improvement in water quality and reduced flooding downstream.

1. Channel Structure. While some channel structure placement may be done from existing roads, most require improving existing secondary access routes or development of temporary access from existing roads into the stream channel. The access is used for moving machinery and materials from the

paved road into the channel. Delivery of materials (logs, stumps, rock and boulders) may require multiple trips, using an excavator. Actual work in the channel is generally done with the same excavator. In previous channel structure project work, most of the access routes through the riparian zone followed existing old roads or trails. Where such old roads or trails are present, they will be utilized in lieu of developing new access routes. The old access routes are generally old roads, skid trails or log haul routes, which are covered with brush and/or alder. Where no existing access route is present, one may be pioneered from the road to the riparian area and stream channel. The development of these accesses usually involves removal of some vegetation, and may include movement of soils. Some disturbance to vegetation and soils occurs as a result of the development and use of access routes. Where compaction of soils occurs, the access routes are subsoiled after completion of the project work to break up the compaction and prepare the site for planting. Following completion of project work, the access routes are rehabilitated to reduce potential erosion, using boulders, logs and vegetation to protect the surface until new plants grow, and trees are planted along access routes and adjoining areas to both rehabilitate the access routes and increase the future source of large woody materials. Ground vegetation, primarily of rapidly growing annuals and perennials, begins regrowing within months of the completion of project work.

Within the stream channel, the machinery moves for variable distances up and down the channel to place the logs, boulders, and smaller rock delivered to the channel. The movement and placement of materials may disrupt the channel bed and banks, producing a transient increase in silt at the project location. Most project activities at a single site are completed in a matter of hours although large structures may require up to three days to complete all aspects of the project activity. In most project locations bedrock is the dominant substrate, reducing potential impacts and silt production from project activities. Work is completed during low flow periods, and very little sediment is transported from the project area downstream. No mortality of salmonids has been observed from channel structuring activities, although some mortality of sculpins and invertebrates has been seen. Salmonids frequently return to the project site within hours after completion of project work. Disturbance to banks is controlled by using a limited number of access points, using accesses that require less disturbance, placement of logs and boulders along the banks, and designing the structures to reduce the impact of project activity. Disturbed banks are protected through placement of boulders, logs or brush at the time machinery is removed from the creek.

In the longer term the channel structure alters the complexity of stream habitats. The structures are expected to raise the elevation of the stream channel, increase deposition of gravels and other sediments, increase retention of woody material generated upstream, and to increase the amount of pool and nursery habitat. Channel changes occur during peak flow periods, with structures designed to interact with peak flows and sediment movement during these flow periods.

Design of structures are based on natural log and boulder structures in the Siuslaw Basin, but of necessity approximate function rather than architecture. Natural log jams relied on large trees with rootwads falling into the channel. Such trees are no longer available in most riparian or immediate upslope areas. Most wood used in projects is from other locations (in Eugene, nearly all from blowdown salvage and road rights of way), which must be transported on public-use roads. This limits logs to a length of fifty feet or less. The logs delivered to the Fish Creek flood plain to be incorporated into structures replacing lost natural logs are older logging debris already cut into log lengths requiring

only transport to the project site location. Because of limited natural boulders delivery, it is proposed to bring in boulders for placement in the stream channel to augment existing boulders.

The log and boulder materials used would be prone to moving out of the project area if not stabilized on site. Boulders may shift downstream but usually remain somewhere in the channel. Logs, because of their lengths and lack of attached root masses, commonly float out of the project area. Key log and boulder structure elements are cabled to prevent them from washing away during high flows and to increase stability of the structure. The anchoring of larger structural logs also reduces the potential damage to downstream culverts, bridges and property. In the absence of cabling very few structures would remain following peak flows. Some smaller logs or boulders are not anchored and are allowed to shift on their own; most become incorporated in the structures. Additional woody material, nearly old smaller, older logging debris, is entrained on the structures, adding to the complexity of the structures. This material does not generally remain for more than a few years, but provides valuable habitat that would be lost if the structures were not present to hold it in the channel.

The Eugene District has been implementing restoration structures for thirty years. Experience has shown that gabions used in the early structures, while effective, have an average lifespan of 10 years. The gabions usually break apart in the middle, but the ends remain along the side of the channel for many years often providing additional habitat. Hand-built structures have a survival span of one to more than 15 years. They tend to be very effective in smaller streams. Boulder structures built 15 years ago remain in place and fully functioning. The larger log and boulder structures have been used for a shorter period of time, but have a retention rate of 70 to 95%. The set of log and boulder structures placed in Fish Creek in 1995 had a survival rate of 95% even after the major flood event in 1996 and the presence of large amounts of sediment and debris in the flood waters. Its is anticipated that the structures to be built under the Proposed Action will have a similar survival rate during any subsequent high flow events.

Anchoring of logs, boulders and stumps with epoxy and cable is done by hand in already disturbed project locations in order to extend the potential life span of the structures and reduce the potential for downstream impacts. The anchoring does not entail additional disturbance to the site although there may be some additional brief disturbance of aquatic organisms in the immediate vicinity of the drilling and cabling. Cabling would be necessary in most structuring in order to retain materials onsite and in a functional pattern.

Proposed channel projects are designed to improve groundwater flow by increasing the groundwater storage capacity of the watershed. Fish Creek is not listed as a 303(d) limited stream. The presence of salmonids is an indication of suitable water quality. A transient increase in sediment is expected while work is done in the stream, but overall water quality is expected to improve slightly as a result of stream structure and an increased removal of subsequent sediment by channel structures and increased interaction with the riparian area.

2. Riparian Restoration. Most riparian restoration projects are designed to be undertaken at the same time as channel structuring although several projects have been done at Fish Creek sites but independent of channel structuring activities. Accesses for channel structuring are developed in locations where riparian restoration is proposed. Some vegetation, primarily brush and red alder, are removed to

create the temporary accesses. Following completion of channel structure project work the accesses are subsoiled to prepare them for planting. Machinery and hand cutting may be used to remove additional red alder and brush in selected plots along the access routes to create larger, more open planting areas. Additional planting areas may be opened to reduce overstory trees and understory vegetation using hand tools. Removal of overstory trees would increase the amount of sunlight reaching planted areas. If not adequately thinned, retained trees, particularly red alder and big leaf maple, have the potential for a rapid increase in lateral branching following removal of competing trees, partially to completely filling the overstory covering the openings created for planting, thus reducing the amount of sunlight reaching planted trees. Because only patches of trees in various spacings are removed from the riparian area to create planting sites, impacts on riparian vegetation and local climatic conditions are limited.

Riparian vegetation is retained on the side of the stream opposite the planting sites to help maintain shading and bank stability. A no cut buffer is retained along the stream on the side where planting will be done (other than at access points), to reduce the amount of sunlight reaching the stream. If other factors, such as upslope vegetation or hillslopes, can be shown to provide adequate shading, and if stream banks are stable, the amount of vegetation retained near the stream may be reduced. The limited monitoring on previous projects detected no change in stream temperature as a result of similar riparian activities. Riparian travel corridors would be maintained. Microclimate conditions along the stream remain similar to pre-project conditions.

Over time, it is anticipated the percentage of riparian areas in conifer would increase. Growth of planted conifers is accelerated through use of standard silviculture practices such as tubing to reduce browsing and control of competing vegetation. Impacts on vegetation communities resulting from silvicultural practices are similar to those in other forest units. Management of competing vegetation is through removal by hand, and has no direct impact on the stream. If girdled trees need to be felled along Fish Creek for safety reasons, no impact is expected to the stream as trees to be felled are fallen away from the channel. In the long term, planted conifers are expected to provide a source of seed for re-seeding adjoining unplanted areas, facilitating further the restoration of conifer stands along the streams.

NO ACTION ALTERNATIVE

Under the No Action Alternative, no project work would be carried out. Loss of spawning gravels would be expected to continue in the short term, with a decrease in available spawning and rearing habitat. Riparian areas would continue to move towards a community of older trees with more conifer but at a slower rate and over a longer period of time. As streamside trees become larger, more of them would be capable of providing stream channel structure and overall habitat would improve. According to the Eugene District RMP EIS, this process would require one hundred years or more to approximate recovery of lost habitat.

PARTIAL IMPLEMENTATION ALTERNATIVE

Under the Partial Implementation Alternative, a portion of the proposed project work would be completed. The impacts and expected outcomes are the same as for the Proposed Action differing only the level of impacts and outcomes. The amount of stream channels structuring and the length of

temporary access needed vary among the seven project sites. The level of impacts and outcomes would depend on how many and which of the seven proposed project sites are implemented.

UNAVOIDABLE AND ADVERSE IMPACTS

Unavoidable impacts associated with implementation of the Proposed Action include disturbance in the riparian area and stream channel, with some loss of riparian alder and brush vegetation. Adverse impacts include temporary disruption of the riparian community and soils and disturbance of the stream channel. Marbled murrelet, spotted owl and coho salmon may be disturbed by operation of trucks delivering materials, operation of heavy equipment in the riparian area and stream channel, and the transient increase in silt in the stream channel.

SHORT TERM VS LONG TERM IMPACTS

Short term impacts include a temporary reduction in riparian vegetation, disturbance of riparian soils, disturbance of the stream channel, and possible disturbance for listed or sensitive species. In the long term, riparian vegetation is expected to regenerate, with an increase in conifer as a future source of habitat in the riparian area and woody structure in the stream, increased stability of the stream channel, and an increase in the availability of spawning and rearing habitat for salmonids and other aquatic species.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

No Irreversible or Irretrievable Commitment of Resources has been identified.

MITIGATING MEASURES

The following mitigating measures have been identified:

1. Scheduling of all work during the year would be in accordance with guidelines issued by the Oregon Department of Fish and Wildlife and U.S. Fish and Wildlife Service.

2. Inspection and maintenance of equipment would be required to reduce the potential for leakage of petroleum products into the stream. When working next to or within the stream channel spill kits would be provided.

3. All heavy equipment shall be cleaned prior to contract work to slow the spread of noxious weeds. Staging areas and stockpile areas shall be free of noxious weeds.

4. Prior to initiation of project work notification would be given of potential road delays or closures. Appropriate safety procedures would be used to control traffic in project areas involving roadways used by the public.

MONITORING AND EVALUATION

All channel project locations are inventoried prior to implementation of project work. A photographic and descriptive record is made of all culvert, channel structure and riparian restoration projects. Channel structure and riparian restoration projects are located using GPS for inclusion in the District GIS data system. Juvenile fish sampling is conducted in selected habitats prior to project work using seining, electrofishing and/or snorkeling. For project areas used by anadromous salmonids, spawning counts have been conducted for up to 17 years to provide a baseline. Three habitat inventories have been completed during the past 18 years, the most recent in 1999-2000, to document changes from previous project activity. This information serves as a baseline for evaluating new project work. Following completion of project work, the projects are visited and photographs taken to compare with conditions prior to project work to show projects in place prior to exposure to peak flows. Subsequent photographs are taken to document changes in the structures, riparian areas or other projects. Spawning ground counts are continued in the established index area. Juvenile sampling, using snorkeling and electrofishing, is used to document use of structures. Information is also collected on non-salmonid fish species both before and after project work. Reference macroinvertebrate samples are also collected at some project sites. Tree survival and growth are documented in riparian restoration areas during at least the first five years following planting.

CONSULTATION AND COORDINATION

The Proposed Action would have no impacts on local air quality, prime or unique farmlands, environmental justice, Native American religious concerns, hazardous or solid waste, or wilderness.

1. Sensitive Species. BLM has completed an inventory of resident and anadromous fish species on Federal lands within the project area that are listed or are candidates for listing under the Endangered Species Act. Survey and Manage species inventories for species included in the SEIS ROD have been completed and appropriate adjustments to the project proposals have been made to protect identified sites. In the event a sensitive species is found during project activities, the individual proposed project would be modified or excluded as required in order to protect the identified sensitive species.

The coho salmon in the watershed is listed as a threatened species. Restoration activities included in this Plan are consistent with the description for aquatic habitat restoration activities and the terms and conditions, as included in the National Marine Fisheries Service June 4, 1999 Oregon Coast Province Programmatic Biological Assessment and Biological Opinion for Oregon Coastal Coho Salmon, and extension to 30 September 2001 dated 5 June 2000, so no further consultation is required.

Activities described in this Plan that may affect the Federally-listed northern spotted owl and marbled murrelet are consistent with the Programmatic Biological Opinion for these species so no further consultation is required.

2. Cultural Resources. No cultural resources have been identified to date in the actual project locations. All required cultural resource reviews would be completed before any project work is undertaken.

3. Areas of Critical Environmental Concerns. No ACECs are located in the project area.

4. Flood plain. The proposed action will have no direct impact on floodplains other than to improve and maintain the connectivity between the flood plain and the stream system.

5. Invasive Non-native Species. Studies have shown that restoration of aquatic habitat, particularly temperature regimes, reduces the potential for colonization by non-native aquatic species. At present non-native fish species introduced into Triangle Lake one mile upstream from the mouth of Fish Creek have not become established outside the Lake although they have been detected downstream and into Fish Creek. Restoration activities are expected to reduce the potential for spread of the non-native aquatic species. Coordination of project activities with botanists decreases the potential for spread of non-native plant species as do the project design features.

6. State and County Land Use. All project activity is coordinated with the Oregon Department of Fish and Wildlife and other State and County agencies as required. Aquatic and riparian habitat restoration was found in the District RMP to be compatible with existing State and County land use laws. The proposed actions are compatible with the Coastal Zone Management plans.

7. Permits. All required permits will be obtained prior to the beginning of project work. All of the structures in the proposed restoration activities are less than 50 cubic yards in size.

8. Aquatic Conservation Strategy. The proposed action is in compliance with the Aquatic Conservation Strategy as described in the Eugene District RMP and Record of Decision, the Record of Decision for the Supplemental EIS for the Northern Spotted Owl, and the Biological Opinion issued by the National Marine Fisheries Service on 18 March 1997.

9. Watershed Analysis. The proposed actions are consistent with the descriptions of existing conditions and management opportunities described in the Lake Creek Watershed Analysis.

BIBLIOGRAPHY

Armantrout, Neil B. 1987. Lake creek Aquatic Habitat Management Plan. USDI Bureau of Land Management, Eugene District, Eugene, OR 27 pp.

Armantrout, Neil B. 1990. Index areas as population indicators. Pp. 71-99, In: Thomas J. Hassler, Ed., Proc. Northeast Pacific Chinook and Coho Salmon Workshop, Arcata, CA. Coop. Fish. Res. Unit, Arcata, CA.

Armantrout, Neil B. 1991. Restructuring streams for anadromous salmonids. Amer. Fish. Soc. Symposium 10:136-149.

USDI Bureau of Land Management. 1987. Lake Creek Aquatic Habitat Management Plan. USDI Bureau of Land Management, Eugene District, Eugene, Oregon. 19 pp plus figures and maps.

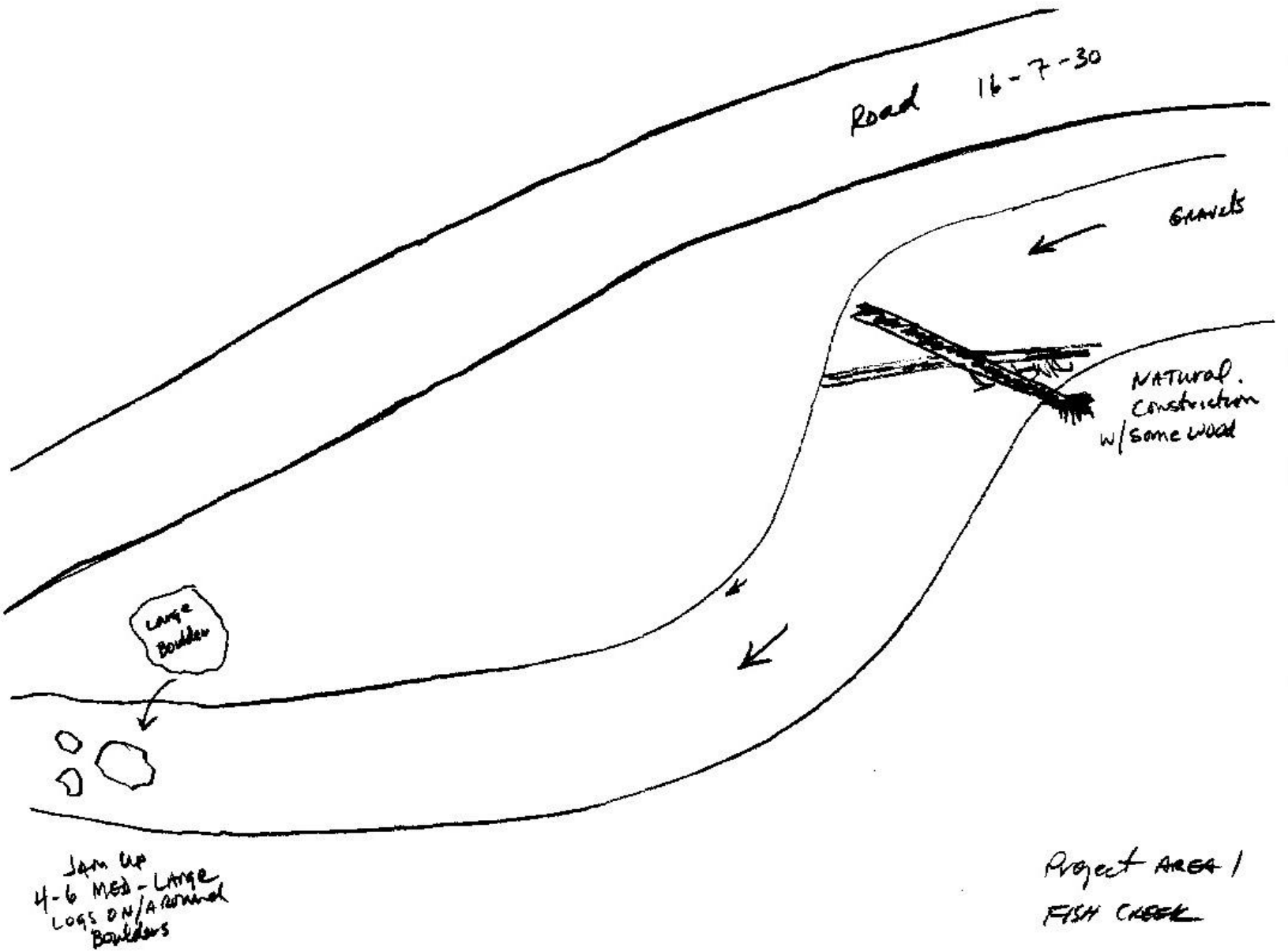
USDI Bureau of Land Management. 1995. Lake Creek Watershed Analysis. USDI Bureau of Land Management, Eugene, Oregon. 128 pp plus maps and figures.

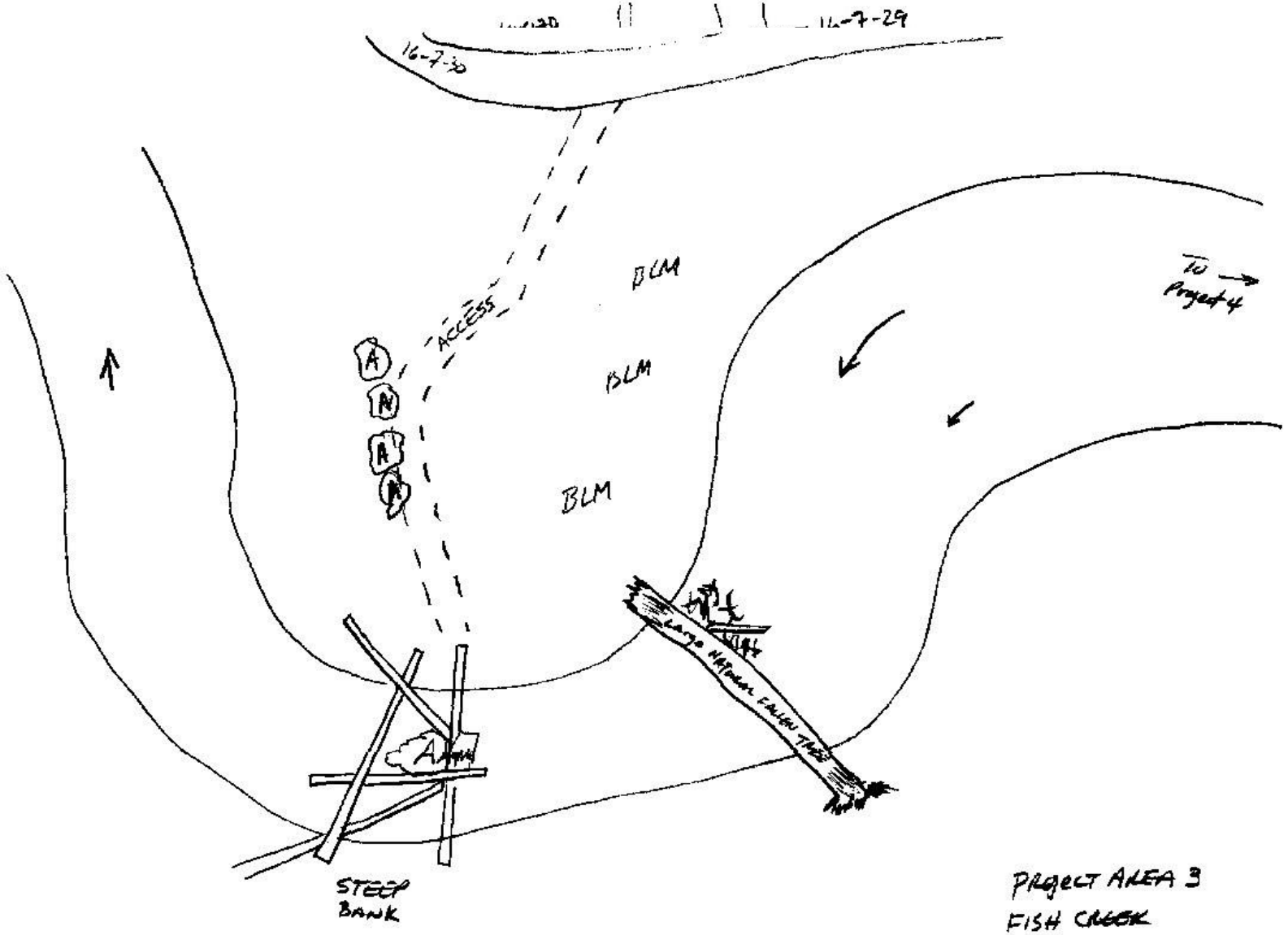
APPENDIX. SITE-SPECIFIC PROJECT LOCATIONS

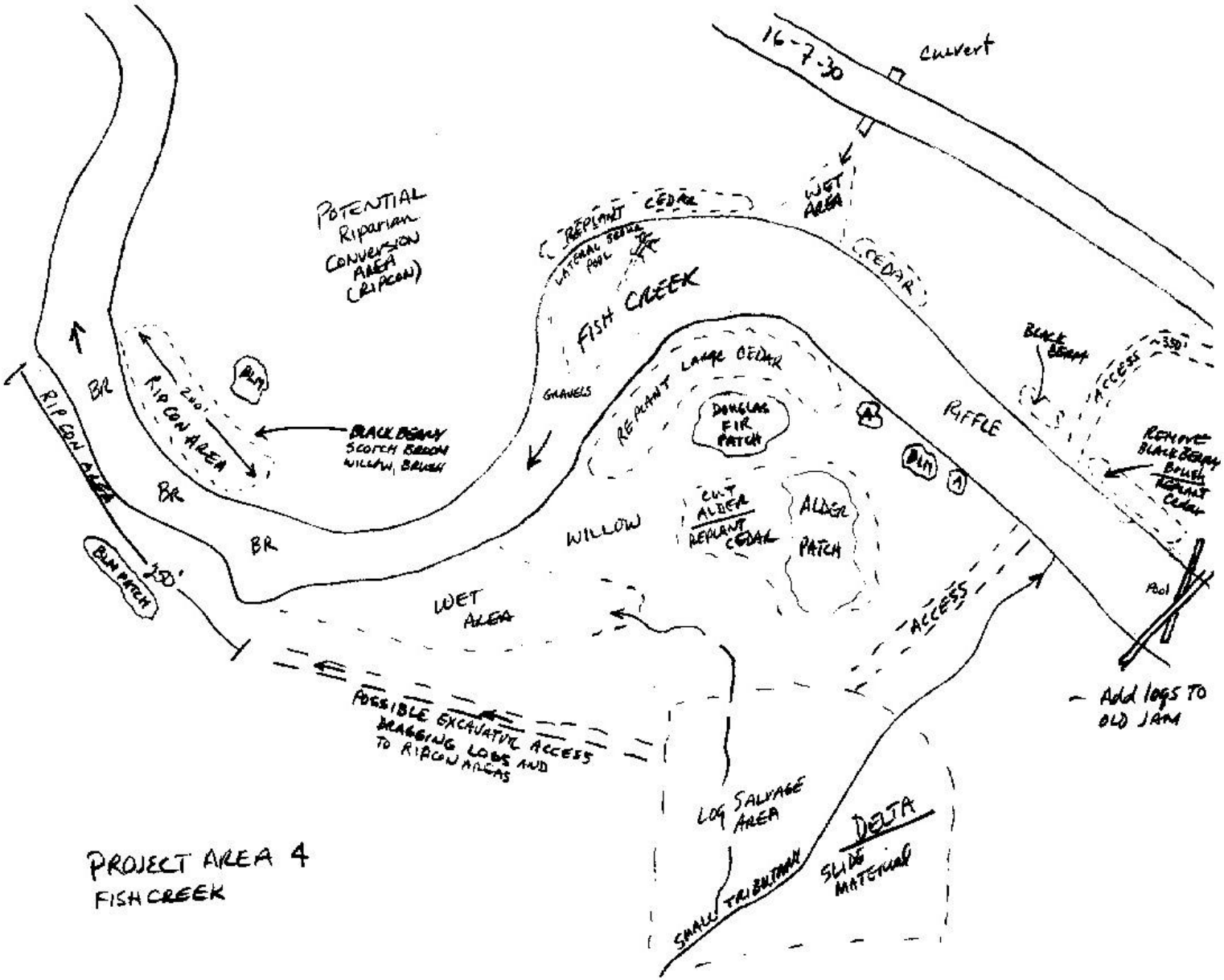
As noted in the Purpose and Need Section of this document loss of key logs has lead to degraded habitats in many reaches of Fish Creek. The loss of habitat from the loss of these logs creates an additional habitat restoration need beyond the project sites identified in an earlier Fish Creek restoration plan that have not been implemented. From August 15 through September 15, 2000 seven stream enhancement projects are proposed for installation in Fish Creek to replace some of the lost key structures. Project installations will be installed using an excavator. The project sites are denoted on maps provided in the appendix. The maps are listed as T.16S, R.07W, Sec 27 and 29.

Project proposals, listed as one through seven, are described as follows: Site 1 - Three to four logs will be placed in the channel with existing boulders to create a jam complex. Placements will be completed adjacent to the channel from the right bank. Site 2 - Utilizing an existing skid road for approximately 250 feet, several logs will be moved from the 16-7-30 roadside to the channel and placed with an existing bridge log to form a log jam. Site 3 - Six logs staged along 16-7-30 will be moved 125 feet to

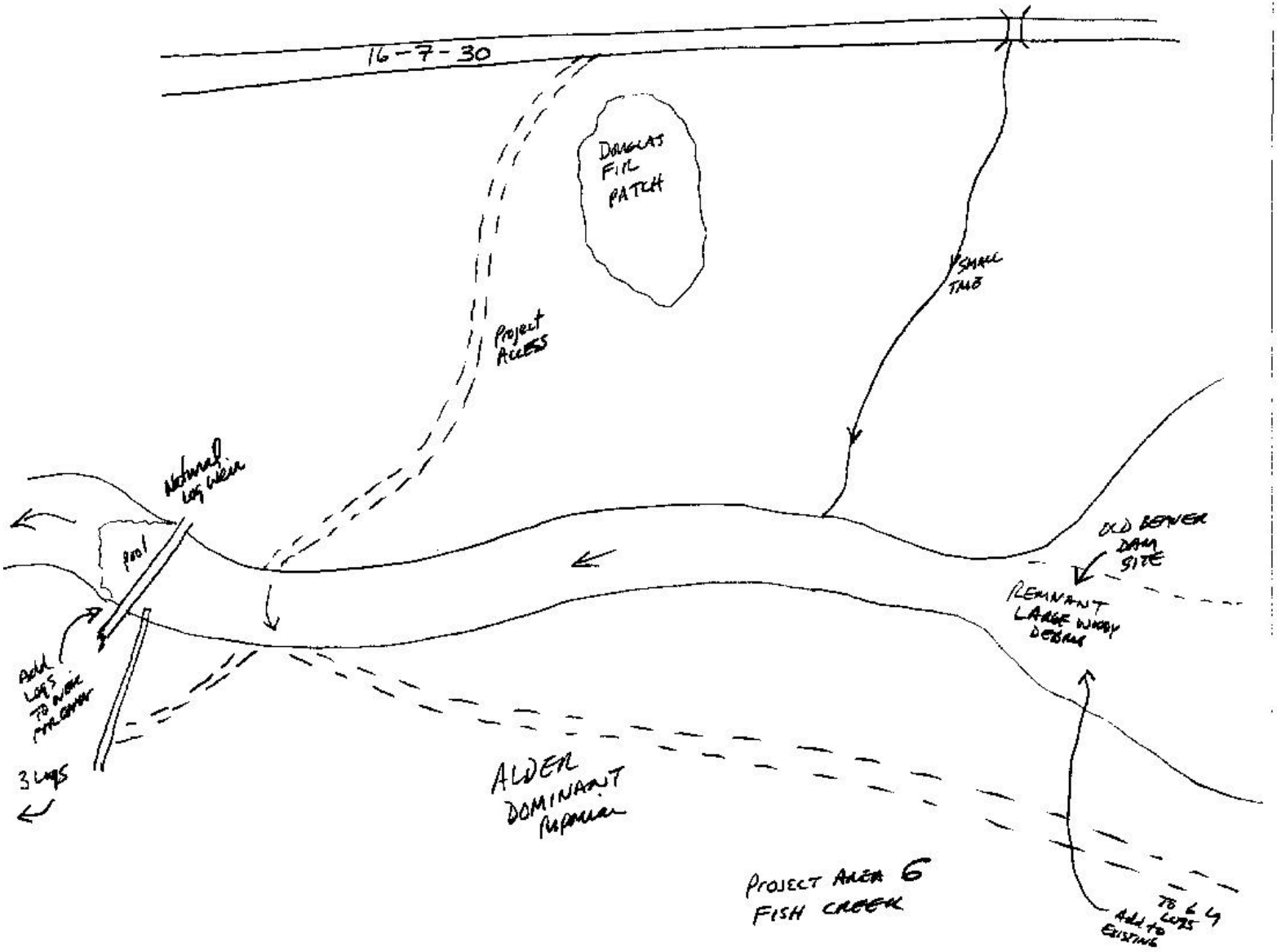
the channel and placed in a jam formation around an existing rootwad. Some of the logs placements will be positioned to collect future woody debris. Site 4 - The access to site 4 is approximately 350 feet on an existing salvage road. Cull logs from a past logging operation and a recent slide will be used to augment an existing log complex. In addition, cull logs may be placed from the banks to provide scour, cover and complexity to existing habitats below the log complex. In addition to log placements, the excavator will be used to remove non-native vegetation and brush species in clearance areas in preparation for planting of conifers. Site 5 - Boulders left from restoration work completed in 1995 along road 16-7-28.4 will be moved 225 feet on an existing skid road (off of 16-7-28.4) to the stream channel. A boulder weir will be constructed here to create rearing habitat for coho. Four to five 12-18" diameter by 50' long longs will be built into this structure to provide cover and collection points for woody debris. Site 6 - Access to site six is over an existing salvage road (~350' long). Off site logs will be installed at a constriction in the channel to form a jam. Below this site, several logs will be added to an existing log weir to increase structural height, deposition above and cover and complexity in the shallow pool below. Site 7 - At this location, the excavator will block and cable logs down into the channel (40 feet below) from the road prism. Logs will be placed in a channel constriction to form a jam. Five to seven logs will be placed at this site. To ensure the integrity of the installations, project jams and weir at all sites will be secured with cable, glue and or clamps.

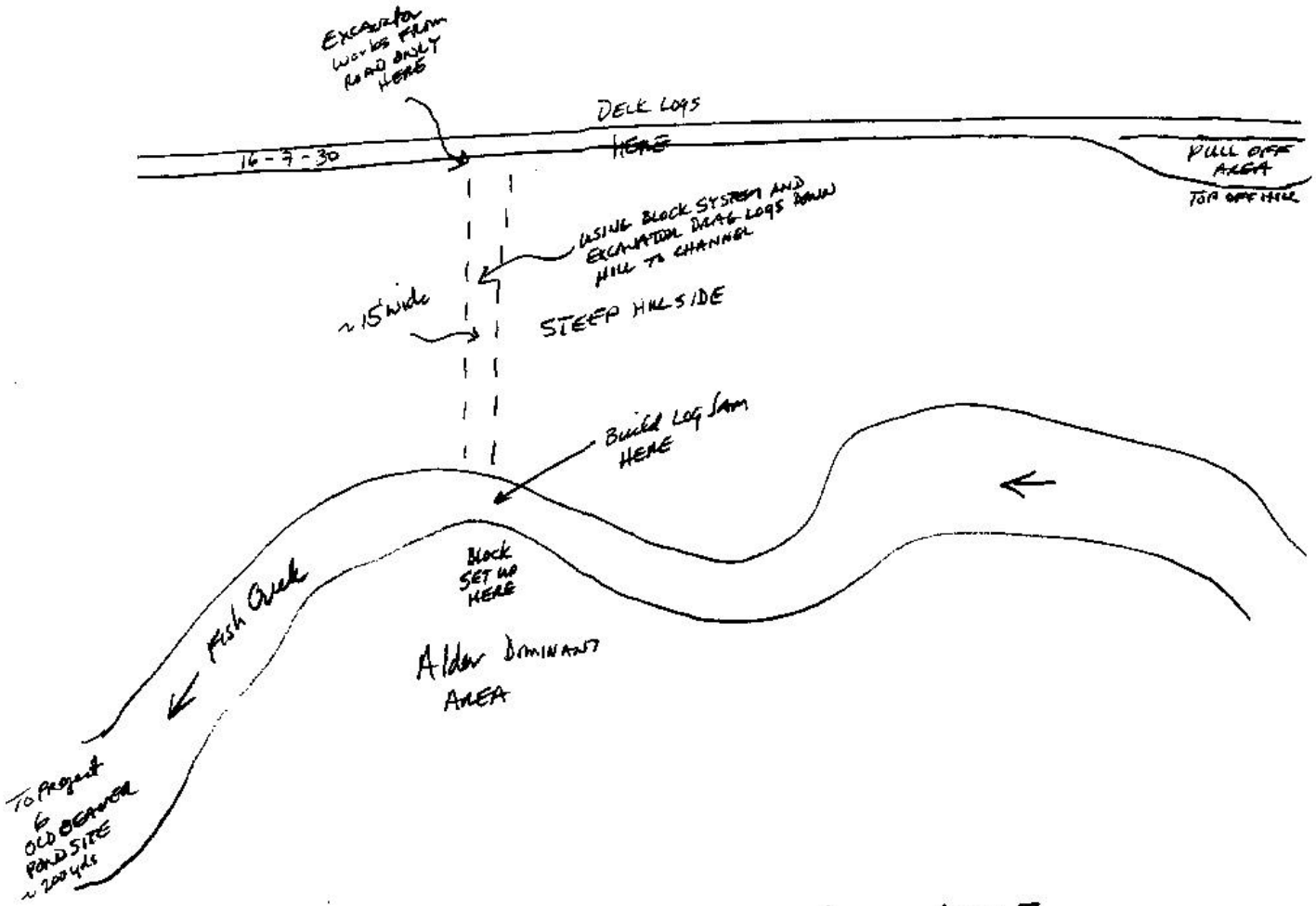

Road 16-7-30
Channels
Natural Constriction w/some wood
Large Boulder
Jam Up
4-6 Med - Large Logs on/around Boulders
Project Area / Fish Creek


16-7-29
16-7-30
ACCESS
BLM
BLM
BLM
To Project 4
A
N
A
N
STEEP BANK
PROJECT AREA 3
FISH CREEK



PROJECT AREA 4
FISH CREEK


16-7-30
DOUGLAS FIR PATCH
SMALL TMB
Project Access
natural log weir
pool
OLD BEAVER DAM SITE
REMNANT LARGE WOODY DEBRIS
ADD LOGS TO MAKE PREVIOUS
3 LOGS
ALDER DOMINANT RIPARIAN
PROJECT AREA 6
FISH CREEK
TO 4 LOGS
ADD TO EXISTING



PROJECT AREA 7
FISH CREEK

Log and boulder structures built in 1996

Log and boulder structures built in 1996

Area where log was lost and gravel is being washed away